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ED 018 098 EF 001 559

A REPORT ON SPACE UTILIZATION.

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PUB DATE AUG 67

EDRS PRICE MF-$0.25 HC-$0.64 14P.

DESCRIPTORS- *INTERIOR SPACE, *SCHOOL SIZE, *SCHOOL SPACE, *SPACE UTILIZATION, PHILADELPHIA

THIS REPORT IS AN IDENTIFICATION OF THE MORE SIGNIFICANT FACTORS WHICH INFLUENCE THE AMOUNT OF SQUARE FOOTAGE INCLUDED IN HIGH SCHOOL, MIDDLE SCHOOL AND LOWER SCHOOL DESIGN. THESE FACTORS ARE RELATED TO THE PERCENT OF UTILIZATION OF THESE SPACES. VARIABLES DETERMINING SPACE ALLOCATION FOR HIGH AND MIDDLE SCHOOLS ARE--(1) THE SQUARE FOOTAGE ALLOWANCE PER TEACHING STATION, (2) THE LENGTH OF CLASS PERIODS AND THE LENGTH OF THE SCHOOL DAY, (3) THE NUMBER OF PERIODS IN WHICH STUDENTS ARE ENROLLED, (4) THE STUDENT-TEACHER RATIO, (5) THE NUMBER OF PERIODS IN THE SCHOOL DAY BEYOND THE INDIVIDUAL STUDENT REQUIREMENTS, (6) THE EXTENT OF SPECIALIZED TEACHING STATIONS OF LIMITED FLEXIBILITY, AND (8) THE AVAILABILITY OF OFFICE AND PLANNING SPACE FOR TEACHERS. WAYS TO REDUCE SQUARE FOOTAGE IN THE LOWER SCHOOLS INCLUDE ELIMINATION OR REDUCTION OF SUCH SPECIAL SPACES AS TEAM PLANNING ROOMS, ARTS ROOM, DIAGNOSTIC CENTER, INCREASE OF STUDENT-TEACHER RATIO, AND REDUCTION OF THE NUMBER OF SQUARE FEET ALLOWED PER CLASSROOM. THE PRESENT ALLOCATIONS WERE DETERMINED TO BE ADEQUATE FOR A PROGRAM OF QUALITY EDUCATION, NONETHELESS, THEY ARE HIGHER THAN MINIMUM STATE STANDARDS. ADEQUATE SPACE DOES NOT GUARANTEE QUALITY BUT IT DOES ALLOW MORE FLEXIBILITY AND SHOULD LEAD TO THE IMPROVEMENT OF EDUCATION. (BD)

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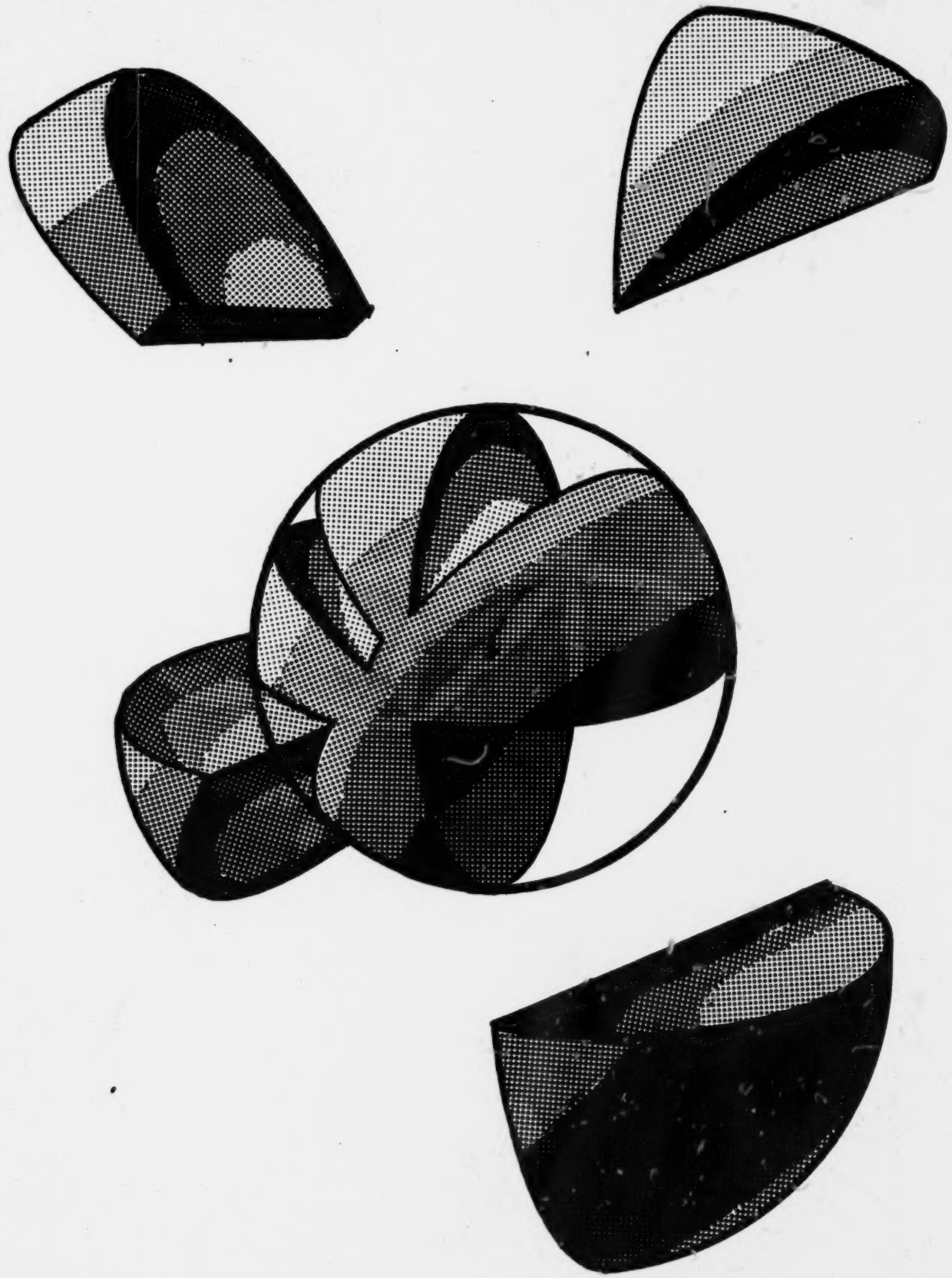

a report on SPACE UTILIZATION

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August, 1967

EF 001559

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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A REPORT ON

SPACE UTILIZATION

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FOREWORD

The purpose of this report is to identify the more significant factors which influence the amount of square footage that is included in the design of the High School, the Middle School, and the Lower School, and to relate these factors to the percent of utilization of these spaces once they are constructed as teaching stations.

These criteria may be also applied to existing school buildings to assist in the determination of the need for possible modernization through the conversion of some special classrooms to other purposes such as general classrooms, and vice versa.

The factors identified in this report are not intended to be all inclusive, and other concerns must have attention, such as the relationship of the plant to the site, the neighborhood to be served, the community expectancies that are already established, and other factors not known at this time which are applicable to each individual school plant.

This report is divided into two parts:

PART I HIGH SCHOOLS AND MIDDLE SCHOOLS

PART II LOWER SCHOOLS

PART I HIGH SCHOOLS AND MIDDLE SCHOOLS

The amount of space allocated for the construction of High Schools and Middle Schools and the percent of space utilization that results depend upon a number of variable factors, some of which are under the control of the School District of Philadelphia.

These variables are as follows:

1. The square footage allowance per teaching station
2. The length of class periods and the length of the school day
3. The number of periods in which students are enrolled and the student-teacher ratio.
4. The number of periods in the school day beyond the individual student requirement.
5. The extent of departmentalization of the educational program
6. The number of specialized teaching stations of limited flexibility
7. The availability of office and planning space for teachers.

1. The square footage allowance per teaching station.

The number of square feet of floor space allowed for teaching stations will determine the total amount of square footage required for the school plant. This relationship is illustrated in CHART I.

CHART I

COMPARISON OF SQUARE FOOTAGE REQUIRED FOR SCHOOLS RANGING IN ENROLLMENT FROM 50 TO 100 TEACHING STATIONS AND VARYING IN SIZE FROM 600 SQUARE FEET TO 850 SQUARE FEET PER CLASSROOM.

	Size of Classrooms		
Number of Classrooms	600 Square Feet	725 Square Feet	850 Square Feet
	Square Feet Required		
50	30,000 square feet	36,250 square feet	42,500 square feet
60	36,000 square feet	43,500 square feet	51,000 square feet
70	42,000 square feet	50,750 square feet	59,500 square feet
80	48,000 square feet	58,000 square feet	68,000 square feet
90	54,000 square feet	65,250 square feet	76,500 square feet
100	60,000 square feet	72,500 square feet	85,000 square feet

From CHART I it can be seen that the number of square feet of floor space allowed for each teaching station significantly affects the total number of square feet in the total school. Present Commonwealth regulations state that 15% of the total number of classrooms may contain 750 square feet and up to 35% of classrooms may be 770 square feet. Thus, 50% of the total classrooms may be under 850 square feet.

2. The length of class periods and the length of the school day.

Where the school day is divided into equal periods, the usual length of periods ranges from 45 minutes to 60 minutes. If the school facility is open for classes from 8:00 A.M. to 5:00 P.M. there would be 9 hours of teaching time available. If class periods are one hour in length, inclusive of passing time, nine periods of teaching would be possible. If the class periods are 45 minutes in length, then 12 periods of instructional time would be available. Other variations in the length of periods would provide a corresponding number of class periods. If the school day is divided further into smaller time modules, such as 12 or 15 minutes, then there would be a greater number of these time modules available.

The length of each class period and the number of these periods in the school day will determine the total time available for instruction.

3. The number of periods in which students are enrolled and the student-teacher ratio.

The number of class periods in which students are enrolled varies among school districts, with the normal range from 5 to 12 periods per day. In Philadelphia, the typical pattern is for students to

be enrolled in 6 classes, plus one period for lunch. If students are assigned to take the same number of classes as there are periods in the school day, then the number of teaching stations required would be determined by dividing the total number of students enrolled by the student-teacher ratio. For example, if the total enrollment is 2,500 students and the student-teacher ratio is 25-1, then the number of teaching stations required would be 100, as shown in CHART II.

CHART II

TEACHING STATIONS REQUIRED FOR ENROLLMENTS OF 2,500, 3000, and 3,500 STUDENTS UTILIZING 25-1, 30-1, AND 35-1 STUDENT-TEACHER RATIOS

	25-1 Student-Teacher Ratio			30-1 Student-Teacher Ratio			35-1 Student-Teacher Ratio		
Enrollment	2,500	3,000	3,500	2,500	3,000	3,500	2,500	3,000	3,500
Teaching Stations Required	100	120	140	83.3	100	116.6	71.4	85.7	100

As can be seen from CHART II, the number of teaching stations required for an enrollment of 2,500 or 3,500 is 100, depending upon the student-teacher ratio that is followed.

4. The number of periods in the school day beyond the individual student requirement.

If the number of periods in the school day is increased beyond the number required for every student, the need for teaching stations decreases accordingly. The number of classrooms required for enrollments of 2,500, 3,000, and 3,500 students is indicated in CHART III, which indicates the number of classrooms needed, assuming that students are signed up for six classes per day.

CHART III

TEACHING STATIONS REQUIRED FOR STUDENTS ENROLLED IN SIX CLASSES DAILY IN SCHOOLS OF 2,500, 3,000, and 3,500 STUDENTS

	25-1 Student-Teacher Ratio			30-1 Student-Teacher Ratio			35-1 Student-Teacher Ratio		
Enrollment	2,500	3,000	3,500	2,500	3,000	3,500	2,500	3,000	3,500
Periods	Teaching Stations			Teaching Stations			Teaching Stations		
6	100	120	140	83.3	100	116.6	71.4	85.7	100
7	86.6	102.8	120	71.4	86.6	100	61.2	73.4	85.7
8	75	90	105	62.5	75	87.5	53.5	64.2	75
9	66.6	80	93.3	55.5	66.6	77.7	48.5	57.1	66.6
10	60	72	84	50	50	70	42.8	51.4	60
11	54.5	65.4	76.3	45.4	45.4	63.6	38.9	46.7	54.5
12	50	60	70	41.6	41.6	58.3	35.7	42.8	50

5. The extent of departmentalization of the school program

If the school program is completely departmentalized and the students change classrooms and teachers every period of the day, this arrangement should allow for maximum use of all facilities that are constructed. Classrooms will be available for continuous use if good scheduling procedures are followed and if the correct number of special and general teaching stations are constructed. Space utilization should approach 100% when the number of students for which the school was designed are actually enrolled and are scheduled accordingly.

6. The number of specialized teaching stations of limited flexibility.

Classrooms which are constructed and equipped with furniture and equipment such as are shops and laboratories, can be used productively as teaching stations only for those subjects. Where it is possible to use these classrooms every period of the day, the percent of utilization can be high, but if enrollment in those subjects does not result in this arrangement, the percent of room utilization will be proportionately low. Proper planning will allow for a room utilization approaching 100% when the number of students for whom the school is planned are actually enrolled.

7. The availability of office and planning space for teachers.

Schools which have been planned for maximum room utilization by providing spaces that are needed every period of the day, and where these rooms are scheduled in an efficient manner, will have a high percent of utilization. The degree to which this utilization can be accomplished depends, in part, upon the availability of teacher office and planning areas. If classroom teachers have a separate place for planning and working during their preparation periods, the classrooms will be free for use by other classes at all times, thereby permitting a higher degree of room utilization; however, if teachers must use their own classrooms for planning and working, this procedure ties up a large classroom area and reduces the percent of room utilization.

SUMMARY

Factors which affect square footage requirement of High Schools and Middle Schools are:

* square footage allowance per teaching station
* length of class periods and length of the school day
* student-teacher ratio
* number of class periods for which students enroll
* number of periods in the school day beyond student requirements

Factors which affect space utilization of the High Schools and Middle Schools are:

* departmentalization of the educational program
* specialized teaching stations with limited flexibility
* office and planning space for teachers
* time
* space allocated

CONCLUSIONS - HIGH SCHOOL AND MIDDLE SCHOOL

1. A higher degree of utilization of teaching stations can be achieved in the High School and Middle School by providing office and work areas for all teachers.

2. An increase in the number of teaching periods during the school day will decrease the total number of teaching stations needed by a given student body.

3. School District policy and student-teacher ratio affect the total number of teaching stations needed in a High School and Middle School. Higher student-teacher ratios such as 30-1 require fewer teaching stations; conversely, smaller student-teacher ratios such as 25-1 necessitates a larger number of teaching stations.

4. Student capacities of buildings can be increased by manipulating such variables as length of class periods, the extent of departmentalization, and class size.

5. Educational program and organizational policies of the School District affect the amount of total space allocated for school facilities. Organizational procedures such as implementing the house concept require more space.

   Policies which seek to implement quality educational programs in schools require the allocation of more space. The rate of utilization of this space, however, can be increased by the manipulation of certain variables associated with time, teacher, student and space.

The School District of Philadelphia has made a commitment of providing a quality educational program for all students, therefore, more specialized areas, adequate teaching spaces, and increased area for supportive services are required in High and Middle Schools all of which increase the overall square footage allocated to a school building.

PART II THE LOWER SCHOOL

The utilization of space in the Lower School cannot be considered in the same terms as that of the Middle School and the High School, since the characteristics of the smaller children and the educational program organized for them do not lend themselves to the degree of classroom mobility found at the higher levels.

The Lower School tends to operate more from the concept of a modified form of the self-contained classroom due, at least in part, to the need of small children to have the security of a home base, a place where they spend most of their school day, and with the same teacher most of the time.

Students of the Lower School do much less moving around than do students in the Middle and High Schools. Where regrouping of pupils does occur, it usually involves another teacher or two who are part of a closely knit team of teachers functioning within a small age or grade span and who are working closely together and using the same room or group of rooms of this purpose.

Even when the basic classroom (home room or home base) is vacated by the students to go to the special music room or the gymnasium, the basic classroom is usually not available for another similar size group of children. If a special teacher is provided for vocal or instrumental music or for physical education, this special teacher sometimes works with the children right in their own room. Even when the special teacher takes the students to a special room this does not normally provide a free classroom for use by another "floating" group of students during that period of time.

Frequently the regular teacher remains in the regular classroom working with other members of her teaching team or spending the time preparing or arranging materials in the room to which the children will soon be returning.

The educational specifications for the City Center Lower School dated September 21, 1966, illustrate well the concept of space utilization in the Lower School:

TEACHING SPACE	SQUARE FEET EACH SPACE	TOTAL SQUARE FEET	TO ACCOMMODATE
1. 25 Classrooms	900	22,500	750 Students
2. 2 Kindergartens	1,500	3,000	100 Students
3. 2 Pre-Kindergarten Nurseries	1,500	3,000	80 Students
4. 1 Instructional Materials Center	4,000	4,000	
5. 2 Small Classrooms	400	800	20 Students
6. 3 Team Planning Rooms	300	900	
7. 1 Diagnostic Center	700	700	
8. 1 Creative Arts Room	1,900	1,900	
9. 1 Instrumental And Choral Music Room	1,600	1,600	
10. 1 Science Laboratory	1,400	1,400	
11. 1 Auditorium-Cafeteria	6,000	6,000	
12. 1 Gymnasium-Recreation Room	6,600	6,600	
13. 1 Teachers Dining Room	600	600	
14. 1 Teachers Lounge Workroom	300	300	
15. 1 Administrative Facilities Suite	2,475	2,475	
16. 1 Instructional Storage Space	5,000	5,000	
TOTAL SPACE ALLOWED		59,650	950 Students

The manner in which the educational program is now organized and operated for primary children of the Lower School does not lend itself well to any scheme to increase the degree of space utlization. Unless the Lower School were to become highly departmentalized with children moving in regimented groups each period to a different teacher in a different room or unless there is a return to the 100% self-contained classroom concept, it is not likely that this pattern of space utlization would change.

Other ways to build Lower Schools using less square footage are as follows:

1. Eliminate or reduce the square footage for the special spaces now being provided such as small classrooms, team planning rooms, creative arts room, diagnostic center, instrumental and choral music room, science laboratory, auditorium-cafeteria, gymnasium-recreation room, teachers dining room, teachers lounge-workroom, administrative offices, instructional storage.

   Note: These spaces have been added to the school plant to meet a critical need for the planning organizing, and operating of a program of quality education.

2. Increase the Student-Teacher ratio to accommodate more students in each classroom, thereby requiring fewer rooms.

   Note: The Student-Teacher ratio has been recently reduced in an effort to improve the quality of the educational program by giving the teacher more time with fewer pupils.

3. Reduce the number of square feet allowed per classroom. This action could save some square footage and still meet Minimum Areas For Elementary School Building Facilities [1] established by the State of Pennsylvania. Possible reductions in this category are as follows:

SPACE	PHILADELPHIA STANDARDS SQUARE FEET	STATE MINIMUM STANDARDS SQUARE FEET	POSSIBLE SAVING SQUARE FEET
1. 25 Classrooms @ 900 Square feet	22,500	21,250 (@ 850)	1,250
2. 2 Kindergarten @ 1,500 square feet	3,000	1,800 (@ 900)	1,200
3. 1 Instructional Materials Center	4,000	1,500	2,500
4. 1 Creative Arts Center	1,900	1,000	900
5. 1 Instrumental And Choral Music	1,600	1,000	600
TOTAL SQUARE FOOTAGE SAVED BY USING STATE MINIMUM STANDARDS			6,450 Square Feet

Note: The number of square feet now being allocated by the School District of Philadelphia has been determined as essential to allow sufficient floor space to organize and operate a program of quality education. Reducing the square footage allocated for the spaces indicated above

would obviously meet minimum standards at a time when the School District of Philadelphia is attempting to reach beyond minimums in order to improve the quality of education.

CONCLUSION

The amount of square feet now being allocated to the Lower School has been determined to be adequate to allow the development of a program of quality education, although substantial reductions could be made and still meet minimum state standards. Adequate space does not guarantee quality education, but it does allow more flexibility and opportunity for the development of innovative practices that should lead to the improvement of education that has become the commitment of the School District of Philadelphia.

[1] BBC-435 (Rev. 1-66) Commonwealth of Pennsylvania, Department of Public Instruction